

IN THE UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

IMRA AMERICA, INC., a Michigan corporation,	)	Case No.: 2:06-CV-15139
	)	Judge: Hon. Anna Diggs Taylor
Plaintiff/Counterdefendant,	)	Magistrate: Hon. Mona K. Majzoub
v.	)	
IPG PHOTONICS CORPORATION, a Delaware corporation,	)	
Defendant/Counterclaimant.	)	
AND RELATED COUNTERCLAIMS	)	

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**PLAINTIFF IMRA AMERICA INC.'S  
REBUTTAL TO DEFENDANT IPG PHOTONIC'S  
OPENING CLAIM CONSTRUCTION BRIEF**

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**I. IPG'S PROPOSED CLAIM CONSTRUCTIONS NOT ONLY VIOLATE FUNDAMENTAL CLAIM CONSTRUCTION PRINCIPLES, THEY ARE BASED UPON A MISCHARACTERIZATION OF THE RELEVANT INTRINSIC EVIDENCE**

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In construing the claims of a patent, the Court must look primarily to the intrinsic evidence, which consists of the patent specification, claims, and prosecution history. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315-17 (Fed. Cir. 2005) (en banc). Here, Defendant IPG Photonics Corp. ("IPG") knows that the patent specification and claims issued as they were originally filed on June 25, 1997. As such, IPG understands that the specification and claims are the pieces of intrinsic evidence that the Court should look to initially in construing the claims of U.S. Patent No. 5,818,630 (filed June 25, 1997) (the "'630 Patent"). *See Phillips*, 415 F.3d at 1314-16. Moreover, the claims as originally filed were recently confirmed as patentable by the United States Patent and Trademark Office during a reexamination procedure, and, during that reexamination, additional claims were allowed and added to the '630 Patent. U.S. Patent No. 5,818,30 C1 (issued Oct. 27, 2009).<sup>1</sup> Notwithstanding its clear understanding of what controls the Court's claim construction analysis in this case, IPG arrives at an erroneous proposed claim construction because its analysis of the specification, claims, and file history is flawed in several respects.

**A. IPG's Proposed Construction of the Term "Mode Converter" Is Flawed as Based Upon a Mischaracterization of the '630 Patent Specification and File History**

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"Mode converter" is broadly disclosed in the '630 Patent specification, and the patentees never limited the scope of that term, explicitly or otherwise. One of ordinary skill in the art at the time of the invention would have understood the concept of mode conversion, and the types

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<sup>1</sup> See Exhibit E. (Exhibits A-D were submitted with IMRA's main brief.)

of mode converters used in fiber-optic systems, such as the systems described in the '630 Patent. (2d Knox Decl. ¶ 10.)<sup>2</sup> In particular, one of ordinary skill in the art at the time of the invention would have understood, upon reading the original specification and claims of the '630 Patent, that the mode converter is a type of converter element used to match the mode of an input beam to the fundamental mode of a multi-mode fiber amplifier. Indeed, the '630 Patent specification as originally filed acknowledges that those skilled in the art were familiar with mode converters. (2d Knox Decl. ¶ 10.) For example, the '630 Patent specification discusses the article “by Strasser et al. ‘Reflective-mode conversion with UV-induced phase gratings in two-mode fiber’, *Optical Society of America Conference on Optical Fiber Communication*, OFC97, pp. 348-349, (1997),” which described using Bragg phase gratings as a mode converter. '630 Patent col.3 ll.34-44. In addition to Bragg phase gratings, many other types of mode converters for other applications were known to those skilled in the art at the time of the invention. (2d Knox Decl. ¶ 10.)

To further illustrate this point, and as will be discussed in more detail below, the dependent claims of the '630 Patent itself point to several possible embodiments of Claims 1’s “mode converter,” including a “tapered single-mode fiber.” '630 Patent col.14 ll.21-23 (Claim 18). These embodiments of a “mode converter” do not necessarily qualify as “an optical imaging system.” (2d Knox Decl. ¶¶ 13,14.)

IPG seeks to improperly limit the scope of the term “mode converter” by reading a limitation from an example in the specification into Claim 1. There is nothing in the '630 Patent specification, claims or file history that limits the scope of what a “mode converter” can be in the context of the invention disclosure as a whole. Particularly, there is nothing in the '630 Patent

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<sup>2</sup> Exhibit F.

specification, claims or file history that would have led a person of ordinary skill in the art at the time of the invention to believe that the “mode converter” of Claim 1 is limited to an optical imaging system, as suggested by IPG. (2d Knox Decl. ¶ 11.) Also, IPG’s mischaracterization of an Amendment submitted by IMRA in connection with the reexamination of the ’630 Patent again, improperly classifies an illustrative example of a “mode converter” as a definition. As will be explained in more detail below, this is an impermissible attempt to limit the scope of “mode converter.” (2d Knox Decl. ¶ 17.)

Further, IPG and its expert, Dr. Bucksbaum, are wrong to state that the ’630 Patent provides a definition for a mode converter as an “optical imaging system.” IPG and Dr. Bucksbaum improperly attempt to support the their position that the ’630 Patent defines the term “mode converter” in that manner, by citing a portion of the specification that states “[t]he mode-converter 50 *can consist* of any type of optical imaging system capable of matching the mode of the MM amplifier 52.” ’630 Patent col.10 ll.26-28 (emphasis added). As will be explained in more detail below, far from such a limited “definition,” the cited portion of the specification is merely an example.

For these reasons, and the reasons discussed in more detail below, a “mode converter” can be any converter element capable of matching the mode of the input beam to the fundamental mode of a multi-mode fiber amplifier. This entirely supports, and is consistent with, Plaintiff IMRA America, Inc.’s (“IMRA”) proposed construction of the term “mode converter” as it is used in Claim 1: “an element capable of matching the mode of a multi-mode amplifier fiber.”

**1. The '630 Patent Claims Illustrate that a “Mode Converter” Cannot Be Limited to “An Optical Imaging System”**

It is well established that in construing a claim term, a court should always consider the patent claims themselves, which “provide substantial guidance as to the meaning” of claim terms. *Phillips*, 415 F.3d at 1314. Specifically, an independent claim must be construed sufficiently broad to cover all of the various embodiments and subject matter in the dependent claims, as well as to cover all of the embodiments in the specification and equivalents thereof. *See id.* at 1314-15; *Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1347-48 (Fed. Cir. 2009); *see also Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1251 n.3 (Fed. Cir. 2008).

Here, important evidence on the meaning of “mode converter” is revealed by considering dependent Claims 18 and 19, each of which depends from Claim 1 and expressly recites a particular example of a “mode converter.” These dependent claims illustrate examples of “mode converter[s]” that do not qualify as “optical imaging system[s],” a requirement IPG wants the Court to read into the construction of “mode converter” in Claim 1. The table below identifies the recited “mode converters” of these dependent claims.

<p>The “optical amplification system according to claim 1,  <i>wherein said mode converter comprises</i>”:</p>	
<p>“a tapered single-mode fiber.”  ‘630 Patent col.14 ll.21-23  (Claim 18).</p>	<p>“combination of a bulk-  <i>optics imaging system</i>  and a tapered fiber.”  <i>Id.</i> col.14 ll.24-26  (Claim 19) (emphasis added).</p>

As can be seen from the table, Claim 18 recites “a tapered single-mode fiber.” A tapered single-mode fiber is not an “optical imaging system,” as that term is used in IPG’s proposed

construction. (2d Knox Decl. ¶ 13.) Because the “tapered single mode fiber” embodiment of a mode converter is not “an optical imaging system,” it is impossible to reconcile IPG’s proposed definition with dependent Claim 18. For the same reason, Claim 19, which recites “a tapered single mode fiber” in combination with “a bulk-optics imaging system,” also does not meet IPG’s narrow definition of “mode converter.” (2d Knox Decl. ¶ 14.)

An independent claim must be construed sufficiently broadly to cover all of the various embodiments and subject matter in the dependent claims; thus, IPG’s proposed inclusion of the limitation “optical imaging system” in the definition of “mode converter” in Claim 1 is improper as it would directly contradict at least two claims depending from Claim 1. *See Phillips*, 415 F.3d at 1314-15; *Kara Tech.*, 582 F.3d at 1347-48; *see also Halliburton Energy*, 514 F.3d at 1251 n.3.

## 2. IPG Misinterprets the ’630 Patent Specification

To interpret “mode converter,” IPG properly directs the Court’s attention to the patent specification. (*See* IPG Brief at 10-11.) IPG errs, however, by failing to direct the Court’s attention to the patent specification *as a whole*. *See Phillips*, 415 F.3d at 1321 (“Properly viewed, the ‘ordinary meaning’ of a claim term is its meaning to the ordinary artisan after reading the entire patent.”). As a result, IPG’s analysis neglects highly material information that sheds light on the meaning of “mode converter” in Claim 1 of the ’630 Patent.<sup>3</sup>

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<sup>3</sup> IPG’s expert also fails to consider the ’630 Patent in its entirety in his supporting declaration (IPG Brief Ex. 2). Dr. Bucksbaum discusses Figures 1, 3 and 4 of the patent in some detail, but he omits any discussion of Figure 5.

**(a) IPG Fails to Consider All Embodiments of “Mode Converter” Disclosed in the Specification and the Understanding of a Person of Ordinary Skill in the Art at the Time of the Invention**

The patent describes the mode converter of Figure 5 of the '630 Patent, which illustrates one of the disclosed embodiments, using the broadest of terms. This includes referencing “an optical imaging system” as *an example* of the recited mode converter: “[t]he mode-converter 50 *can consist* of any type of optical imaging system capable of matching the mode of the MM amplifier 52.” '630 Patent col.10 ll.26-28 (emphasis added). The specification elaborates on this point, stating that “[f]or example, a lens system [a type of optical imaging system] may be employed.” *Id.* col.10 l.28. The patent specification then states: “[a]lternatively, a section of tapered fiber may be employed[.]” *Id.* col.10 ll.29-30. Thus, in connection with the block diagram of Figure 5, the patent specification teaches that a section of tapered fiber is *a separate exemplary embodiment* from a lens system as taught by Figure 1. This is analogous to the separate embodiments recited in dependent Claims 17 and 18, which recite a bulk-optics imaging system and a tapered single-mode fiber, respectively.

At the time of the invention, a person of ordinary skill in the art would have understood that there were many different mode converters available, and that not all of these mode converters could be considered “an optical imaging system.” (Knox. Decl. ¶¶ 12-14.) Additionally, as discussed above, the '630 Patent specification specifically describes the use of a Bragg grating as a mode converter. *See* '630 Patent col.3 ll.26-44. A Bragg grating is just one more example of a mode converter known by those of skill in the art for use in other applications. (2d Knox Decl. ¶ 10.)

A patent term is generally only narrowed beyond its ordinary meaning when there is a manifest expression, disclaimer, or disavowal of claim scope. *See, e.g., Home Diagnostics, Inc.*

*v. LifeScan, Inc.*, 381 F.3d 1352, 1358 (Fed. Cir. 2004) (“Absent a clear disavowal or contrary definition in the specification or the prosecution history, the patentee is entitled to the full scope of its claim language.”); *accord Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1381 (Fed. Cir. 2009). There are no such expressions, disclaimers, or disavowals in the ’630 Patent’s specification or the file history. In fact, due to the Patent Office’s allowance of the claims as filed (i.e. without any rejection or requests to narrow them) and the results of the reexamination proceeding, where the patentability of the claims was confirmed, the claims are entitled to a broad scope and should be interpreted broadly and not narrowed.

**(b) IPG Draws Its Proposed Definition of “Mode Converter” from a Single Isolated Example in the Specification**

Instead of considering the patent as a whole, IPG focuses myopically on a single sentence directed at the optical imaging system embodiment that IPG elevates to being a “definition” of the claim term. The table below shows IPG’s sleight of hand in changing the patent’s “can consist of” to the very different word “is”:

<p>“The <b>mode-converter 50 can consist of</b> any type of optical imaging system capable of matching the mode of the MM amplifier 52.” ‘630 Patent col.10 ll.26-28 (emphasis added).</p>	<p>“This is not what the patent specification says. It says that a <b>mode converter is</b> ‘any type of optical imaging system[.]’” (IPG Brief at 14 (emphasis added).)</p>
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IPG’s treatment of this sentence as a definition is legally improper. Any express definition of a claim term must be *clearly set forth* in the written description. *See, e.g., Jack Guttman, Inc. v. Kopykake Enters., Inc.*, 302 F.3d 1352, 1360 (Fed. Cir. 2002); *see also Elekta Instrument S.A. v. O.U.R. Sci. Int’l, Inc.*, 214 F.3d 1302, 1307 (Fed. Cir. 2000) (“[T]he written description in such a case must clearly redefine a claim term ‘so as to put a reasonable competitor or one reasonably skilled in the art on notice that the patentee intended to so redefine that claim term.’” (citation omitted); *E.I. Du Pont de Nemours & Co. v. Phillips Petroleum Co.*,

849 F.2d 1430, 1433 (Fed. Cir. 1988) (“Where a specification does not *require* a limitation, that limitation should not be read from the specification into the claims.”) (citation omitted). Because the sentence merely discloses what a mode converter “can consist of,” it does not rise to the level of being a definition. Moreover, a person of ordinary skill in the art at the time of the invention would have understood that a mode converter can consist of “an optical imaging system,” or several different elements that do not necessarily qualify as “an optical imaging system.” (2d Knox Decl. ¶¶ 12-14.)

### **3. IPG Mischaracterizes The '630 Patent Reexamination**

IPG suggests that IMRA’s representations to the Patent Office during the reexamination of the '630 Patent support IPG’s position that a “mode converter” necessarily is an optical imaging system. (See IPG Brief at 12.) IPG is wrong. The excerpt of IMRA’s Amendment cited by IPG pertains to IMRA’s distinguishing a prior art reference, Yang, that disclosed the use of a lens at the input of a fiber amplifier. IMRA discussed the prior art’s use of a lens and explained why the reference did not disclose a “mode converter” at all. IMRA also created “an illustrative example” of mode matching, including the schematic illustration reproduced on page 12 of IPG’s brief. Following a familiar pattern, IPG mischaracterizes IMRA’s “example” as a “definition.”<sup>4</sup>

IMRA made no statements to the Patent Office that narrowed or otherwise modified the meaning of “mode converter” from the broad meaning provided by the '630 Patent claims and specification. IMRA’s statement was not a manifest exclusion, disclaimer or disavowal which

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<sup>4</sup> IPG’s expert, Dr. Bucksbaum, repeats IPG’s error in misinterpreting an illustrative example as defining claim scope. Dr. Bucksbaum’s opinion should be afforded little weight because it is not how a person of ordinary skill would interpret that figure in IMRA’s Amendment. (See 2d Knox Decl. ¶ 11.) Further, Dr. Bucksbaum has yet to offer an opinion on who is one of ordinary skill in the relevant art.

indicated clearly and definitely that the claim was limited only to optical imaging systems. IPG's argument also is thus inapposite and misleading.

#### **4. IPG's Reliance On Extrinsic Evidence Is Misguided**

Faced with an intrinsic record that contradicts its own proposed definition, IPG resorts to using *extrinsic evidence* to try to prop up its position, particularly in the form of U.S. Patent No. 7,190,511 (filed Jan. 26, 2006) (the “511 Patent”), from a different family than the '630 Patent. (See IPG Brief at 13.) While courts may consider extrinsic evidence, it is well established that courts give extrinsic evidence less weight than the intrinsic record when determining the meaning of claim language. *Phillips*, 415 F.3d at 1317. *C.R. Bard, Inc. v. United States Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004). Here, IPG's analysis of the unrelated '511 patent is far removed from any relevance to construction of the '630 Patent's invention and adds nothing of value to the analysis of the '630 Patent's claims.

#### **5. IPG's Attack on a Fictional “Means Plus Function” Claim Is Misguided**

IPG argues that IMRA contends that the claimed “mode converter” is entirely functional. (See IPG Brief at 14.) To the contrary, both parties agree that a “mode converter” is structural. IMRA, for example, has already discussed at length exemplary structural embodiments associated with Claims 18 and 19, and has pointed to several other possible structures that can serve as mode converters. (See § I(A)(1)-(2), *supra*; see also 2d Knox Decl. ¶¶ 12-14.)

Further, IPG offers the hypothetical that *if* IMRA had written the “mode converter” claim term differently (i.e., to include “element”), then the claim term would be subject to the special requirements of 35 U.S.C. § 112, ¶ 6. This argument is nonsensical and unrealistic. It sets up a straw man and then knocks it down. IPG could equally well argue that *if* IMRA had written the claim terms the same way that IPG proposes construing them, then IPG's construction would

prevail. Unfortunately for IPG, it is the Court's responsibility to construe the claims as written, not based on a fictitious rewriting conceived by IPG in the midst of litigation.

Finally, IPG mischaracterizes the law of claim construction, arguing that that the word "element" lacks structure and would invoke 35 U.S.C. § 112, ¶ 6. (IPG Brief at 14-15.) This is not generally true. *See Advanced Cardiovascular Sys., Inc. v. SciMed Life Sys., Inc.*, 261 F.3d 1329, 1338-39 (Fed. Cir. 2001) (construing "connecting element" as structural). The trigger word for invoking 35 U.S.C. § 112, ¶ 6 is "means." IPG misleads the Court by citing *Mas-Hamilton Group v. LaGard, Inc.*, 156 F.3d 1206 (Fed. Cir. 1998) (IPG's Brief at 15), as exemplary in applying 35 U.S.C. § 112, ¶ 6. To the contrary,

we have seldom held that a limitation not using the term "means" must be considered to be in means-plus-function form. In fact, we have identified only one published opinion since *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580 (Fed. Cir. 1996), in which we have done so, and that case provides a useful illustration of how unusual the circumstances must be to overcome the presumption that a limitation lacking the word "means" is not in means-plus-function form.

The exceptional case is *Mas-Hamilton Group v. LaGard, Inc.*, 156 F.3d 1206 (Fed. Cir. 1998).

*Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1362 (Fed. Cir. 2004).<sup>5</sup>

**B. IPG Makes an Attempt to Change the Meaning of the Term "Converting the Mode of the Input Beam to Match a Fundamental Mode of the Multi-Mode Fiber Amplifier" by – Again – Mischaracterizing the Intrinsic Evidence**

In defining the claim term "converting the mode of the input beam to match a fundamental mode of the multi-mode fiber amplifier," IPG simply repeats back the claim

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<sup>5</sup> IPG also mischaracterizes *Aristocrat Technologies Australia Pty Ltd. v. International Game Technology*, 521 F.3d 1328 (Fed. Cir.), *cert. denied*, 129 S. Ct. 754 (2008) (IPG Brief at 14), which holds that, for computer-implemented inventions with means-plus-function claiming, the particular structure disclosed in the specification must be more than a general purpose computer or microprocessor. *See Aristocrat Techs.*, 421 F.3d at 1333. Clearly *Aristocrat Technologies* has no relevance to claim construction in this case.

language with a new phrase, “*to cause it*,” inserted into the middle of the claim term.<sup>6</sup> IPG, once again, violates the canons of claim construction by inserting unnecessary language that impermissibly narrows the scope of the claim term.

### **1. IPG’s Definition Changes the Meaning of the Claim Term**

IPG argues as if its definition merely “clarifies” the existence of a causal relationship in the claim. (See IPG Brief at 16.) However, because there is no support in either the claims or the specification for the idea that there is a causal relationship being described, IPG’s argument is not persuasive.

As written, this claim term requires converting the mode of the input beam to match a fundamental mode of the multi-mode fiber amplifier. This is what the claim states and it is clear on its face as written. (2d Knox Decl. ¶ 18.) The claim term results in an input beam with a converted mode that matches a fundamental mode of the multi-mode fiber amplifier. However, the claim language places no restrictions on the causation that results in the mode-matching.

IPG’s definition, on the other hand, conflates “converting” and “to match” such that both must result from a single causal agent with no other intervening effects. Inserting the phrase “*to cause*” in this term alters the meaning because it creates a situation where “converting the mode of the input beam” can be the only thing that makes the beam “match a fundamental mode of the multi-mode fiber amplifier.” In reality, a person of ordinary skill in the art would have understood at the time of the invention that “converting the mode of the input beam” does not necessarily or exclusively *cause* the beam to “match a fundamental mode of the multi-mode fiber

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<sup>6</sup> IPG argues that its definition is necessary because “these [claim] terms all use technically complex terminology, well outside the ken of the lay juror.” (IPG Brief at 2.) Since IPG has opted to define this claim terms using *words from the claim term itself*, IPG fails to explain how words that are “outside the ken” of the lay juror suddenly become understandable to the juror when they are used in IPG’s proposed definitions.

amplifier.” (2d Knox Decl. ¶ 18.) Also, in the limited cases where a causal relationship may exist, the additional causal language IPG suggests should be added is unnecessary. (2d Knox Decl. ¶ 18.) Thus to read a causal requirement into this term impermissibly narrows its scope because it reads out viable, non-causal alternatives that would have been understood by a person of skill in the art at the time of the invention.

## 2. IPG Improperly Narrows The Meaning of “[To Cause It] To Match”

IPG also uses its causation requirement to narrow the claim in another way. In reference to the Figure 1 embodiment of the '630 Patent, IPG argues that the *change in size* of the single-mode output from the oscillator “causes the match.” (IPG Brief at 16.) IPG elaborates on this, stating that “[c]onversely, without this correct *change in size*, *there is no match* to the fundamental mode of the multi-mode fiber amplifier.” (*Id.* (emphasis added).) These arguments reveal that IPG interprets “[to cause it] to match” to *require a change in mode size*. This is an incorrect interpretation.

As stated in the Abstract of the '630 Patent, “a single-mode is launched into the MM fiber by *matching the modal profile* of the fundamental mode of the MM fiber with the diffraction limited optical mode at the launch end.” '630 Patent at [57]. The reference to “modal profile” is recognition that a mode has a size *and a shape*. (2d Knox Decl. ¶ 19.) The fundamental modes in different multi-mode fibers and the modes supported in single-mode fibers have different shapes depending upon the optical properties of the fiber, such as the core diameter and the index of refraction profile. (See 2d Knox Decl. ¶ 19.) Accordingly, “to match a fundamental mode of the multi-mode fiber amplifier,” may be satisfied by a *change in mode size* that results in a match. It also may be satisfied by a *change in mode shape* that results in a match. It may also be satisfied by a *change in both mode size and shape* that results in a match. IPG’s definition excludes two of these possibilities.

### **3. The Intrinsic Record Does Not Support IPG's Positions**

There is no support in the intrinsic record for either (1) adding a causation requirement; or (2) limiting the meaning of “to match” to require a change in mode size. IPG characterizes the Figure 1 embodiment of the patent as if it discloses both. (*See* IPG’s Brief at 16.) This is pure attorney argument, as the patent claims and the patent specification are both silent on these points. Indeed, the words “cause” and “causation” never appear in the patent, and nowhere does the patent describe “to match” as being limited to a change in mode size. Unsurprisingly, IPG neither cites nor quotes passages in the patent that expressly support its interpretations.

IPG also wrongly asserts that during the reexamination of the ’630 Patent, IMRA distinguished a prior art Yang reference by arguing that the system in Yang “did not *cause* the input beam to match the fundamental mode of the multimode fiber amplifier.” (IPG’s Brief at 17.) In fact, IMRA made no arguments based on causation during the reexamination of the ’630 Patent. Causation never arose as an issue during the reexamination for the simple reason that the ’630 Patent claims do not recite any language relating to causation.

### **C. IPG Improperly Narrows “Mode-Converted Input Beam” Through Its Proposed Construction**

IPG proposes that “mode-converted input beam” should be interpreted as “an input beam whose mode has been converted to match a fundamental mode of the multi-mode fiber amplifier.” (IPG’s Brief at 17.) As with the previous claim element, IPG argues that its added language merely “clarifies” the claim term. (*See* IPG Brief at 17.) Yet, once again, the claim term is clear as written, and there is no need to clarify it further. Furthermore, IPG’s adding of language improperly narrows the meaning of the claim term.

Specifically, IPG’s definition includes the phrase “whose mode has been converted to match.” This reveals that IPG is seeking to narrow this claim term in the same improper manner

that it narrowed the previous claim term, by implicitly importing IPG's erroneous interpretation of "**to match.**" That is, IPG's definition interprets a "mode-converted input beam" as necessarily having a mode that underwent a change in mode size. As discussed above, a change in mode shape could also satisfy the claim.<sup>7</sup> (2d Knox Decl. ¶ 19.) Further, a person of ordinary skill in the art would have been able to understand the term "mode-converted input beam" without any further guidance. (2d Knox Decl. ¶ 20.)

**D. IPG Improperly Limits "an Amplified Beam Substantially in the Fundamental Mode" Through Its Proposed Construction**

IPG argues that this claim term is ambiguous because it fails to define what it means for a beam of light to be "in" the fundamental mode. (See IPG Brief at 18.) To the contrary, a person of ordinary skill in the art would understand that a beam is "in" the fundamental mode when the energy content of the beam is propagating in the fundamental mode. This point does not appear to be in dispute between the parties. (See *id.*)

The parties are also in agreement that whether a beam is "substantially in the fundamental mode" may be assessed by determining how much of the energy in the beam is propagating in the fundamental mode. (See, e.g., IPG Brief at 19.) That is where the parties' agreements end, however, and IPG proceeds to make three important errors in its interpretation of this claim term.

**1. "Substantially All" Is the Wrong Standard**

The claim term covers an amplified beam that is *substantially in the fundamental mode*. IPG seeks to make the limitation harder to satisfy by raising the standard from "substantially" to

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<sup>7</sup> IPG argues that IMRA's expert, Dr. Knox, agrees with IPG's proposed definition for this claim term, quoting from Dr. Knox's expert report on infringement. To the contrary, Dr. Knox disagrees with IPG on this claim term. The statements of Dr. Knox which IPG cites were not directed at the "mode-converted input beam" claim term, but rather discussed specific embodiments disclosed in the patent specification. (See 2d Knox Decl. ¶ 20.)

“substantially *all*.” This standard comes from IPG, and IPG alone. The phrase “substantially all” never appears in the ’630 Patent claims or specification. Moreover, a person of ordinary skill in the art would not have understood the terms “substantially” and “substantially all” to be interchangeable in the context of this claim. IPG’s definition may only prevail if it overcomes the heavy presumption that the ordinary meaning of the claim language applies. *See, e.g.*, *Phillips*, 415 F.3d at 1312-13.

**2. “Substantially” Should Not Be Defined to Have a Numerical Boundary**

The definition that IPG offers to the Court (“an amplified beam having substantially all of its energy content in the fundamental mode”) is *qualitative*, recognizing that the claim term should not be interpreted quantitatively (i.e., should not be defined as a particular fraction of power in the fundamental mode). This is the legally proper way to treat the claim term, as the term “substantially” is commonly used in patent claims to avoid strict numerical boundaries. *See, e.g.*, *Anchor Wall Sys., Inc. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1310-11 (Fed. Cir. 2003). “The term “substantial” is a meaningful modifier implying “approximate,” rather than “perfect.” *Playtex Prods., Inc. v. Proctor & Gamble Co.*, 400 F.3d 901, 907 (Fed. Cir. 2005) (citation omitted); *see also Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1360 (Fed. Cir. 2003) (“The term ‘substantially’ . . . denotes approximation”.).

However, IPG in its Brief argues that the claim term should be interpreted *quantitatively*, such that an amplified beam is “substantially in the fundamental mode” when “at least 99% of its energy content” is in the fundamental mode. (IPG Brief at 19.) This definition is (1) inconsistent with the qualitative definition IPG proposes to the Court, (2) inconsistent with the large body of case law that directs Courts not to interpret “substantially” with a numerical boundary, and (3) inconsistent with the ’630 Patent specification. Specifically, Figure 2 of the

Patent discloses exemplary test results for an optical amplification system used to practice the invention. (2d Knox Decl. ¶ 28.) A person of ordinary skill in the art reading the '630 Patent would interpret these test results to show that much less than 99% of the power in the beam leaving the amplifier was propagating in the fundamental mode. (*Id.*) While these test results are merely exemplary (and should not be used as a definition), they show the unreasonableness of IPG's position that a beam must have more than 99% of its light in the fundamental mode to be "substantially" in the fundamental mode.

### **3. IPG and Its Expert Misinterpret Figures 3 and 4 from the Patent**

IPG's sole support for elevating the standard from "substantially" to "substantially all" appears to come from an analysis of Figures 3 and 4 from the '630 Patent. Specifically, IPG interprets Figure 3 as test data for a beam "substantially in the fundamental mode," with at least 99% of its power in the fundamental mode. IPG interprets Figure 4 as test data for a beam that is not "substantially in the fundamental mode," having (based on calculations done by IPG's expert, Dr. Bucksbaum) about 75% to 80% of its power in the fundamental mode. There are many flaws with this analysis, including:

- Figures 3 and 4 are, at best, *illustrative*, and a person of ordinary skill in the art would not view them as defining the scope of this claim term (2d Knox Decl. ¶ 27);
- Figures 3 and 4 are "autocorrelation plots," which reveal information on the time sequence of a propagating series of pulses. To a person of ordinary skill in the art, these types of plots may be used to accurately *quantify timing*. They cannot, however, be used to accurately quantify the energy content in different modes of light (2d Knox Decl. ¶ 26);
- Dr. Bucksbaum's calculation purportedly showing that Figure 4 reveals a beam with 75% to 80% of its power in the fundamental mode is *technically impossible*. No one, including Dr. Bucksbaum, can calculate from Figure 4 the fraction of power propagating in the fundamental mode of the beam (2d Knox Decl. ¶ 23);
- Dr. Bucksbaum's opinions and "first order calculations" are *extrinsic evidence* that should be afforded low weight relative to the clear teachings of the intrinsic record; and

- Even if IPG and Dr. Bucksbaum could quantify the energy in the fundamental mode for the beams for the autocorrelation plots in Figures 3 and 4 (which they cannot), the plots would simply reflect *exemplary test results*, and they do not constitute clear statements defining claim language, and they do not manifest a disavowal of claim scope.

IPG concludes its analysis of Figures 3 and 4 with the conclusory argument that “[t]hese two examples clearly demonstrate” that “substantially all of the energy content of the amplified beam” must be in the fundamental mode to satisfy this claim term. (IPG Brief at 20.) IPG provides no explanation for why or how the last step of its analysis morphs from a quantitative assessment of autocorrelation plots to a qualitative definition of the claim term. This is not the perspective of a person of ordinary skill in the art reading the patent. (2d Knox Decl. ¶¶ 21-28.)

## II. CONCLUSION

Based on the foregoing, each of IPG’s proposed claim constructions should be rejected. IMRA’s proposed constructions comport with the interpretation of a person of ordinary skill in the art, and the Court should rule in IMRA’s favor on each.

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**CERTIFICATE OF SERVICE**

I certify that on December 23, 2009, I electronically filed:

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